COMPARATIVE ANALYSIS OF ALTERNATIVE FINANCING PLANS FOR THE CLINCH RIVER BREEDER REACTOR PROJECT

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As mandated by the Congress, the Department of Energy has transmitted a new plan for financing the Clinch River Breeder Reactor Project (CRBRP) involving greater participation from the private sector. At the request of the Subcommittee on Energy Conservation and Power of the House Committee on Energy and Commerce, the Congressional Budget Office (CBO) has prepared an analysis of the proposed financing plan, assessing its long-term impact on the federal budget compared to the alternative of full federal funding of the remaining costs. This paper describes the background of the new financing plan and the CBO analysis of its budget impact.

BACKGROUND

The CRBRP was authorized in 1970 and initial appropriations were provided in 1972. The cost of the project was estimated in 1972 to be $699 million, based on manufacturers' conceptual designs. In 1973, utilities committed themselves to pay $257 million plus interest to the CRBRP. The Department of Energy now estimates that interest will raise the utility commitment to more than $340 million. After detailed cost estimates and reference designs were completed in 1974, the estimated costs of the project rose to over $1.7 billion, assuming operation in 1982. Funding restrictions, delays, licensing requirements, and cost reestimates have since raised the estimated costs to over $4 billion, of which nearly $1.7 billion has been spent. In the Further Continuing Appropriations Act for Fiscal Year 1983, the Congress directed the Department of Energy to report on options to secure additional private sector participation in the CRBRP that would reduce the federal budget requirements. An initial report was submitted in March, and a second more detailed plan was submitted in early August. No funds were included in the Energy and Water Appropriations Act of 1984 for the CRBRP pending action on private financing. Work continues, however, on site preparation activity.

Responsibility for the CRBRP is governed by contractual agreements involving the Department of Energy, the Commonwealth Edison Company, the Tennessee Valley Authority (TVA), and the Project Management Corporation (PMC). The latter represents the interests of contributing utilities in the management of the project. The Breeder Reactor Corporation (BRC) was established to represent the electric power industry in providing assistance and support to the project.

Under present working agreements, if the project is to be completed by 1990 as currently planned, the government will be responsible for providing an estimated additional $2.3 billion to complete construction. As part of their original commitment, utilities (through the BRC) are obligated

to provide an additional $175 million. 1/ The TVA is required to purchase power generated by the CRBRP for the first five years of the project's operation, and has the option to purchase the plant at the end of that period. No specific agreements have been reached regarding the operation of the project after the five-year period.

THE BRC PLAN

In response to the Congressional directive, the Department of Energy explored options to secure additional private sector financing for the CRBRP. The Breeder Reactor Corporation prepared a proposal that would increase private participation in the funding of the CRBRP. It includes $1.5 billion in additional government financing and $825 million in additional private funds, the latter consisting of $675 million in short-term lending and $150 million in equity participation (see Table 1 below). This plan was endorsed by the Administration and transmitted to the Congress by the Department of Energy on August 1, 1983.

TABLE 1. PROPOSED SOURCES OF CRBRP FUNDS, 1984-1990 (In millions of dollars)

	Current Arrangements	Proposed BRC Plan	Difference
Government Appropriations	2,325	1,500	-825
Utility Contributions	175	175	---
Equity Participation	---	150	150
Private Lending	---	675	675
Total	2,500	2,500	---

1/ This is in addition to the utility contributions to date, which, with accrued interest, total $166 million.

Under the proposed plan, the federal government would be required to cover the full costs of the equity investment, as well as principal and interest payments on the debt, through various tax benefits, project revenues, and, if necessary, federal payments. Thus, the proposal embodies virtually no risks to the new private sector participants. The short-term private investment of $675 million would be retired in 1990 by the issuance (by the equity investors) of an estimated $1.04 billion in 30-year bonds, which would cover the $675 million in short-term construction loans plus interest accrued at 10 percent. The plan would require a government commitment to cover the principal and interest payments on the bonds, either from the reactor's power sales or, if those are not adequate, from other government funds. The sale of $150 million in equity shares in the project would be attracted through a guarantee of tax benefits and a share of revenue not needed to pay interest on the debt. Because of the uncertainties associated with the newness of the technology, licensing requirements, and the volume and price of future electricity sales, the BRC proposes that the government guarantee that both the equity and the debt holders will be repaid their investments, as well as a minimum rate of return. The actual rates of return would be open to negotiation and would reflect market conditions at the time. All cost overruns would be paid for in full by the federal government.

THE ALTERNATIVE: GOVERNMENT FINANCING

For the purpose of this analysis, the BRC plan is compared to an alternative that assumes:

- Federal funding of an additional $2.3 billion in construction costs;
- Utility contributions, already committed, of $175 million;
- Continued government operation of the reactor through the year 2020, with sales of power at market rates throughout the period;
- Completion of the project at the same cost and at the same time as under the BRC plan.

As with the proposed BRC plan, this alternative (which we will generally refer to as the "government-financed" plan) would require a change in the current contractual agreements, because of the present requirement that the TVA must buy the power produced by the CRBRP for

the first five years at avoided energy costs. 2/ This restriction could, at the discretion of the Congress, be maintained or removed regardless of which financing plan is selected. Therefore, in analyzing the two basic alternatives, power sales at market rates were assumed for both.

The analysis also assumes that TVA would not exercise its option to purchase the reactor after five years of operation. In view of TVA's recent reductions in its own plans for construction of power-generation facilities, all indications are that TVA would probably not acquire the plant.

ESTIMATED BUDGET IMPACT OF THE BRC PLAN

CBO has analyzed the budgetary impact of the proposed BRC plan on both outlays and tax revenues, assuming that the project is completed within current cost estimates and on schedule, and that the financing terms would be those assumed by the developers of the plan.

Compared to the government-financed plan described above, the BRC plan would:

- Reduce federal outlays for project construction;
- Reduce federal tax revenues in the early years (through 1995), and increase them in subsequent years; and
- Reduce or eliminate federal receipts from the sale of power.

Each of these effects is discussed separately below.

Construction Outlays

Under the BRC plan, the government would spend $1.5 billion and private parties $1.0 billion to complete the CRBRP. This would reduce federal outlays by $825 million between 1984 and 1990--with $150 million provided by equity investors and $675 million covered by short-term construction loans.

2/ Avoided energy cost is the incremental cost to an electrical utility of electric energy or capacity or both.

Tax Revenues

The equity participants, in return for their investment, would be entitled to potentially large tax credits and deductions. The proposal does not assume any new tax benefits; it only requests that the federal government guarantee to make appropriate repayments to the equity investors if the current tax incentives are not made available as planned. On this basis, the equity investors would be entitled to the 10 percent investment tax credit on the $825 million of private investment, depreciation on 95 percent of the investment using the accelerated cost recovery system (ACRS), and deductions of construction interest costs. 3/ Offsetting these tax losses would be the revenue generated by taxes on the bond interest and on power revenues received by the equity investors.

The Investment Tax Credit. The equity holders would be entitled to take the 10 percent investment tax credit (ITC) on the full amount of the private investment ($825 million), as progress payments were made on the CRBRP. Over the 1984-1990 period, the cost of these credits to the U.S. Treasury would be $82.5 million.

Accelerated Depreciation. The equity participants would be allowed to take depreciation under the accelerated cost recovery system. Because the proposal requests that the project be exempted from the rules regarding public utilities, it is assumed that that property would be depreciated over five years. (If the property was classified as public utility property, it would be depreciated over ten years.) The investors would be allowed depreciation deductions based on only 95 percent of the cost of the project. They could not depreciate 100 percent of their investment because of the 50 percent basis adjustment for the ITC required by the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA).

3/ In general, the deductions and credits from the CRBRP would exceed the anticipated income from the project during the construction phase and its first few years of operation. Because of this, the BRC plan has been designed as a partnership so that the investment tax credit (ITC) and the deductions for depreciation and construction interest could be used to reduce the investors' outside taxable incomes. The partnership arrangement outlined by the BRC would allow the full tax deductions to be passed through to the equity investors. Because of the "at-risk" rules in the tax code, it is expected that virtually all of the equity participants would be corporations. The at-risk rules limit an individual's tax loss in any given investment to the amount the investor stands to lose in the venture. These rules do not apply to corporate investors.

For the purposes of this analysis, it is assumed that the equity investors would be corporations subject to a marginal tax rate of 46 percent. The private investors would not be allowed to start taking depreciation until 1991, when the plant was placed into service. The revenue loss to the government from these deductions would be an estimated $361 million, occurring over the 1991-1995 period. (If the property was classified as public utility property, the revenue loss would be the same but would be spread out from 1991 through 2000.)

Construction Interest. It is assumed that the investors would be allowed to deduct interest expended during the construction period (1984-1990), estimated to total $365 million. Although the interest would be deductible by the equity holders, it would constitute taxable income to the lenders. The net cost of this provision to the government would be the differential in tax rates between the equity investors and the lenders. In this analysis, it is assumed that the equity investors would be in the 46 percent tax bracket and the lenders in the 25 percent tax bracket. 4/ This difference in tax rates would result in a net cost to the government of $77 million over the 1984-1990 period. If the borrowers and lenders were assumed to be in the same tax bracket, this provision would not result in a net cost to the Treasury.

Although it is assumed that the equity holders would be allowed to expense interest during the construction phase of the project, they might be required by the Internal Revenue Service (IRS) to "capitalize" the interest payments. 5/ TEFRA requires firms to capitalize interest payments related to nonresidential real property. Although ten-year public utility or five-

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4/ The tax rate on the equity holders is higher than the assumed rate on the bondholders because the equity participants will primarily be corporations (which have a marginal rate of 46 percent). The bond interest recipients are assumed to be individual taxpayers. The average marginal tax rate for individuals receiving interest income is approximately 25 percent (see U.S. Department of the Treasury, Internal Revenue Service, Statistics of Income--1979, Individual Income Tax Returns, 1982).

5/ Capitalized interest payments would not be deductible when expended but would be added to the basis of the property and recovered through depreciation. That is, the value of the property would increase by the amount of construction interest and would therefore increase the annual depreciation deduction proportionately. In addition, the capitalized interest payments would be eligible for the 10 percent ITC during the year in which they were incurred.

year recovery property is not considered in the class of nonresidential real property for depreciation, part of the CRBRP could be considered real property for purposes of the interest capitalization provision. The effect of capitalizing the interest payments is discussed later in this analysis.

Bond Interest and Power Sales. Offsetting the cost of the tax benefits allowed the private parties are the additional tax revenues associated with the project. The proposal estimates that the CRBRP would generate sufficient power sales to pay both the interest (at 10 percent) and the principal on the $1.04 billion of long-term debt. On an annual basis, the revenue required to pay off the bonds would be $110 million. For purposes of this analysis, it is assumed that the investors receive $110 million per year composed of net income, after operating expenses, from power sales or government appropriations. 6/ (If net sales income is less that $110 million, the government is assumed to cover the shortfall.) In the event that net income exceeds $110 million, it is assumed that the difference is turned over to the Treasury. (Although the plan is unclear as to how the revenues over $110 million would be shared, the assumption used here is conservative in that any residual revenue allocated to the private parties increases the net cost to the government of the BRC option.) Under these assumptions, the $110 million in annual net income is therefore not affected by the actual prices and costs of power over the life of the CRBRP.

It is assumed that the full $110 million per year received by the equity investors is used to pay off the long-term bonds. Because only the interest portion of the bond repayments constitutes a deduction for tax purposes, the equity investors would owe tax on the difference between the $110 million in revenue and the bond interest expense. Because the interest payments are also taxable income to the recipients, the full $110 million would be subject to taxation--partly to the equity investors and partly to the bondholders. The total additional tax revenue is estimated to be $29 million in 1991, increasing gradually to $49 million in 2020. 7/

6/ This is the assumption in the BRC proposal of 350 megawatts of capacity, utilized at 65 percent, and sold for 11 cents per kilowatt hour. Operating expenses are assumed to be 5.5 cents per kilowatt hour, yielding net sales income of 5.5 cents per kilowatt hour.

7/ The tax revenue grows from $29 million to $49 million because the bondholders are in a lower tax bracket (25 percent) than are the equity holders (46 percent). Because the bonds are assumed to be fully amortized over 30 years (structured like a mortgage), the percentage of the $110 million paid in interest declines over the life of the loan. Therefore, the share of the $110 million subject to the lower 25 percent tax rates falls, and the share subject to the 46 percent rate rises, over the 1991-2020 period.

Federal Receipts from the Sale of Power

While under the BRC plan revenues from power sales would accrue to the equity holders, such revenues would be paid to the Treasury under the government-financed plan. These receipts, net of operating costs, would be $110 million per year over the project's 30-year life, under the assumptions of this analysis. 8/

The cash flows to the federal government for the two basic alternatives are summarized in Table 2.

In the short run (1984-1990), the private financing plan would save the federal government $825 million in construction outlays. These savings would be partially offset by tax losses of $159 million ($82 million in ITC and $77 million net interest during construction). As a result, the net saving to the government in the short run would be an estimated $666 million.

Between 1990 and 2021, however, the government would relinquish $3.3 billion in potential power sales. In addition, the private parties would be entitled to ACRS deductions worth $361 million. Offsetting these costs would be tax revenues (from the bond and equity holders) in the amount of $1.05 billion. Thus, the private plan would add $2.6 billion more to the federal deficit than the government-financed case over the 1990-2021 period. 9/

8/ More generally, power sales are assumed to be equal in both the BRC and the government-financed cases. Under the BRC plan, if net income from sales is less than $110 million, the government must appropriate the difference to pay off the bondholders; in the government-financed case, it forgoes the same amount of power revenue. In other words, the incremental cost to the government of net sales income less than $110 million is identical in both cases. Because the government is assumed to retain 100 percent of the revenues in excess of $110 million, the marginal revenue from an increase in sales is the same for both cases. Because of this symmetry, the difference in net costs of the two plans does not vary if net power income differs from the assumed $110 million.

9/ These estimates do not include changes in interest on the public debt that would result from the two alternatives. Such interest costs are reflected in the present value analysis discussed in the following section.

TABLE 2. COMPARISON OF THE BRC PLAN AND THE GOVERNMENT-FINANCED PLAN (In billions of dollars)

	BRC Plan		Government-Financed Plan	
	1984-1990	1991-2020	1984-1990	1991-2020
Construction Outlays	1.5	---	2.3	---
Tax Losses				
ITC	0.1	---	---	---
ACRS	---	0.4	---	---
Interest deductions (net)	0.1	---	---	---
Less: Tax Revenue	---	-1.1	---	---
Less: Power Sales Income	---	---	---	-3.3
Total Increase or Decrease (-) in the Deficit	1.7	-0.7	2.3	-3.3

NOTE: The amounts in this table represent current cash flows, not discounted present values.

PRESENT VALUE ANALYSIS

Because the value to the government of receiving a dollar ten years from now is different (and less) than the value of receiving the same dollar today, it is useful to discount future outlays and revenues so that the alternatives can be more accurately compared. Discounting all future dollar amounts puts all cash flows on a commensurate basis, regardless of the year in which they occur. The total of all discounted future cash flows is the discounted present value of a project, and it reflects the current value of all dollar amounts. The discount factor used in this analysis is 6.75 percent, which represents the estimated after-tax cost of federal borrowing consistent with the bond rate assumed by the BRC plan. 10/

10/ The pretax interest rate is assumed to be 9 percent. Bondholders are in a marginal tax bracket of 25 percent, which results in an assumed after-tax interest rate of 6.75 percent.

Under the assumptions used in this analysis, the BRC plan would cost the government almost $250 million more than if the Congress chose to fully fund the project. (More precisely, the discounted value of the private plan is $248 million less than that of the government-financed version.) This indicates that the short-term savings from the BRC plan would not offset the higher costs to the government over the life of the plant.

The higher cost of the private plan reflects the fact that, under the BRC plan, the government is essentially borrowing funds from the private sector and paying a guaranteed rate of return higher than normal government borrowing costs. 11/ Under the private plan, the after-tax rate of return earned by the equity investors is about 37 percent; the rate of return for the bondholders is 7.5 percent. The difference between these rates and the government's after-tax discount rate (6.75 percent) accounts for the higher long-term cost to the government of the BRC plan.

SENSITIVITY ANALYSIS

The results of the above analysis do not change greatly even when the major assumptions are modified. Under varying assumptions, the private plan generally costs the government more than government financing, although the differences may be less than the $248 million (in present value terms) of the basic case described above.

Six alternative cases were analyzed to study the effect that modified assumptions would have on the present value of the BRC plan, as compared to the government-financed plan. They are as follows:

(1) Ten-Year Public Utility Property

Instead of depreciating the CRBRP over five years, it is assumed that the property is defined as ten-year public utility property. If all other assumptions are held constant, this change reduces the present value of the depreciation deductions and thereby reduces the cost to the government of the BRC plan by an estimated $24 million. The cost of the private plan, on a present value basis, would still exceed that of the government-financed version by $224 million.

11/ This is essentially the same conclusion reached by the General Accounting Office in its "Analysis of Studies on Alternative Financing for the Clinch River Breeder Reactor" (GAO/RCED-83-151), May 12, 1983.

(2) Construction Interest Capitalized

In the base case, it was assumed that construction interest was expensed. Alternatively, it can be assumed that the construction interest must be capitalized and recovered through depreciation. 12/ (It is likely that the actual tax treatment of the construction interest would fall somewhere between full capitalization and expensing.) Since the capitalization of interest payments would delay the realization of some of the tax benefits to the investors, this assumption would reduce the cost to the government of the BRC plan by an estimated $12 million on a present value basis. The cost of the private plan would still exceed that of the government-financed alternative by about $236 million.

(3) Equal Public and Private Borrowing Rates

The basic analysis assumed that the government's discount rate was 6.75 percent--based on a 9 percent borrowing rate and a 25 percent marginal tax rate. It can be argued, however, that the 1 percent interest difference (between 10 percent and 9 percent) should not be counted as an advantage of the government-financed case because it does not reflect the "true" cost of capital. Because the government is removing funds from the private sector that have an assumed marginal cost of 10 percent, the government's discount rate should reflect the alternative private cost of capital. If the discount rate is raised from 6.75 percent to 7.5 percent, the relative cost of the private plan is reduced, but remains $168 million above the government-financed alternative. 13/ (This difference reflects the return above 7.5 percent provided to the equity investors.)

(4) Combined Assumptions

If the assumptions in the three foregoing cases are combined--that is, the property is depreciated over ten years, all interest is capitalized, and

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12/ Capitalized interest payments are also allowed the investment tax credit when they are incurred.

13/ If the general level of interest rates varies from those assumed in the BRC plan, both the returns required by the investors and the appropriate discount rate would change. Such variations would not significantly affect the results of the analysis.

the discount rate is 7.5 percent instead of 6.75 percent--the cost to the government of proceeding with the private financing plan would be reduced, but would still be about $117 million above the cost of government financing.

(5) Power Sales to TVA

Under current contractual agreements, CRBRP power must be sold to the TVA for the first five years. If this requirement is maintained, power revenues would be substantially lower than if power was sold to private utilities. This case compares the government-financed option, assuming power sales to TVA, with the BRC plan, assuming sales to other utilities. It is assumed that the power is sold to TVA at cost--that is, the net cash inflow over the first five years is zero. After five years, net income from power sales is assumed to revert to the $110 million per year level. For this analysis the reduction in power sales is applied only to the government-financed case; in the private plan, net income is assumed to remain $110 million for all years. By sharply reducing federal receipts under the government-financed plan, this assumption would significantly increase the attractiveness of the private plan, to the extent that its long-term cost to the government would be $59 million less than the cost of the government-financed plan. However, just as the Congress, under the BRC plan, could terminate the obligation to sell CRBRP power to TVA, it could presumably take the same action under government financing.

(6) Reduced Power Sales

This case combines the five-year TVA assumption from case (5) above with an assumption of reduced power sales under the private plan in the first five years. In this case, it is assumed that private power sales are only 75 percent of $110 million (or $82.5 million) in the first five years. This could occur if the plant operated at a low capacity or prices were lower than anticipated. In this case, the government would have to appropriate $27.5 million per year in order to cover the repayments of the private bonds. Compared to case (5), the assumption of reduced private power sales increases the cost of the BRC plan because of this appropriation. If all other base case assumptions are held constant, the difference in discounted present value between the two financing alternatives is only $17 million.

The results from these sensitivity cases are summarized in Table 3. Both the government's discounted present value and the equity holders' rate of return are presented for each case. The differential cost to the government of the two financing alternatives is also shown. In all but one

case, the cost of the BRC plan exceeds that of the government-financed option. Only case (5) has the opposite result, and that requires an assumption that power would be sold to TVA for the first five years, at below-market rates, only under the government-financed plan. Thus, if the Congress chooses to sell electrical power at below the private market price, the public plan may be the more costly alternative. On the other hand, if the Congress decides to sell the CRBRP power at private market prices, the public plan will be the less costly alternative. In sum, as long as the CRBRP power is sold at the same price under either the private or the public plan, the private plan will be the more costly alternative. The relative discounted cost of the private plan as against the public plan ranges from $117 million to $248 million under the alternative cases shown here.

It should be noted that the assumption that all residual revenues from the project accrue to the federal government minimizes the cost of the private plan. If a share of the annual net income (over the $110 million needed to pay off the bonds) was dedicated to the equity holders, the comparative cost of the private plan would be greater than shown in each of the cases. Therefore, depending on the revenue sharing agreement, the net cost to the government of the private plan could be higher than indicated here.

Finally, if annual net income from power sales fell below $110 million, the costs of both the plans would rise by the same amount, because the government would bear the cost in either event. Thus, the relative costs of the two alternatives do not change if power income is less than $110 million a year. 14/

14/ Again, this assumes that the actual power sales would be the same in both alternatives, even though the amount would be less than $110 million a year.

TABLE 3. SENSITIVITY ANALYSIS OF THE COST OF THE CRBRP (In millions of dollars)

Case a/	Discounted Present Value			Equity Holders' After-Tax Rate of Return
	Government-Financed Plan	BRC Plan	Difference b/	
(1) Ten-Year Depreciation	-1,105	-1,329	224	33.5
(2) Capitalized Construction Interest	-1,105	-1,341	236	27.2
(3) 7.5 Percent Government Discount Rate	-1,184	-1,352	168	36.8
(4) Joint Assumptions 1, 2, and 3	-1,184	-1,302	117	22.5
(5) Five-Year Sales to TVA	-1,413	-1,353	-59	36.8
(6) Reduced Power Sales and Five-Year Sales to TVA	-1,413	-1,430	17	36.8
Initial Base Case	-1,105	-1,353	248	36.8

a/ For further explanation of the cases see text.

b/ The difference represents the comparative discounted cost of the private plan versus government financing. A positive difference indicates the private plan costs more than the public plan, and vice versa.